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Indoor
Fire Protection UPS System

AFP 10 Series

AIP900-0012-B0-001

Rev. F, 2/2011

Alpha Industrial Power, member of the Alpha Group

Suwanee, GA, USA. Telephone: 1 800 996 6104 Fax: 678 584 9259

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Rev. F, 2/2011

Table of Contents

1.	Introduction	Page 4-8
2.	Safety Instructions	Page 9
3.	Installation Instructions	Pages 10-14
4.	Component Manual Reference Information	Page 15
5.	UPS system drawings	Pages 16-18
6.	Alpha Industrial Power Product Warranty	Page 20
7.	Alpha Industrial Power Factory Service Information	Page 21

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TECHNICAL MANUAL: AFP 10 SERIES UPS

1.0 SCOPE

1.1 System

This manual describes a continuous duty, single phase, on-line, solid state uninterruptible power supply system, hereafter referred to as the AFP 10 series modular UPS.

2.0 SYSTEM DESCRIPTION

2.1 Applicable Standards

The AFP UPS is compliant with the current revisions of the following standards:

- ANSI C62.41 (IEEE 587) – Guide on Surge Voltages in AC Power Circuits (up to 600V)
- UL 1481 – Standard for Safety Power Supplies for Fire-Protective Signaling Systems
- National Electrical Code (NFPA-70)
- NEMA PE 1-2003 – Uninterruptible Power Systems (UPS) – Specification and Performance Verification
- OSHA

2.2 Components

The AFP 10 UPS consists of the following components:

A. Cordex™ switched mode charger/rectifier

B. Cordex™ System Controller (CXC), Software Version 2.0

C. Pulse-Width Modulated (PWM) modular Inverter with built in modular static switch

D. Manual Make- Before-Break (MBB) bypass switch

E. Input Circuit Breaker & Output Breaker

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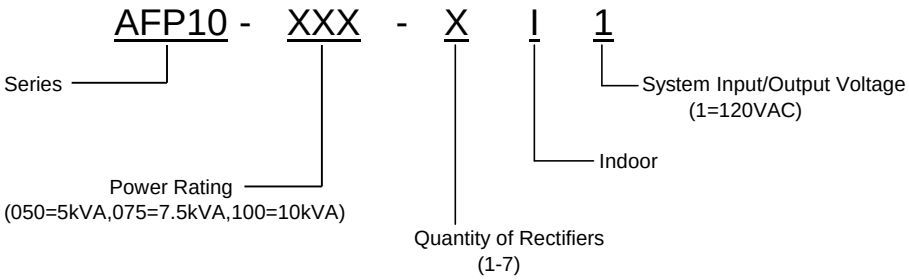
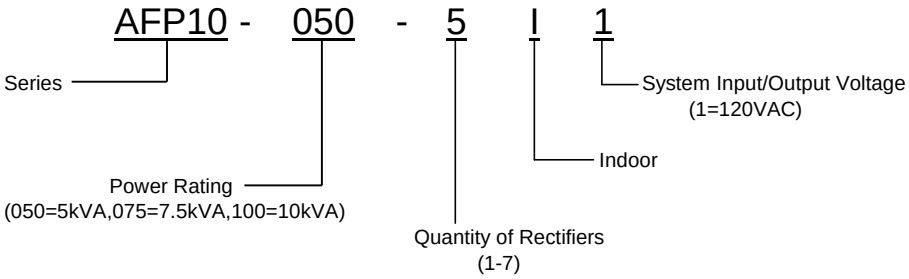
2.3 AFP 10 Series UPS Model Number Explanation



Example:
AFP 10 Series Modular UPS, 5 KVA Power Rating, Quantity of Rectifier Modules = 5, Indoor, 120VAC System Input/Output Voltage



UPS Input - AFP10-050-XI1, AFP10-075-XI1, AFP10-100-XI1

120 VAC, 1 Phase, 50/60 Hz, 12A max per rectifier module, 20.8 max per inverter module; Supervised

UPS Output -

AFP10-050-XI1 - 120 VAC regulated, 1 Phase, 50/60 Hz, 5 kVA, 0.75pf
AFP10-075-XI1 - 120 VAC regulated, 1 Phase, 50/60 Hz, 7.5 kVA, 0.75pf
AFP10-100-XI1 - 120 VAC regulated, 1 Phase, 50/60 Hz, 10 kVA, 0.75pf

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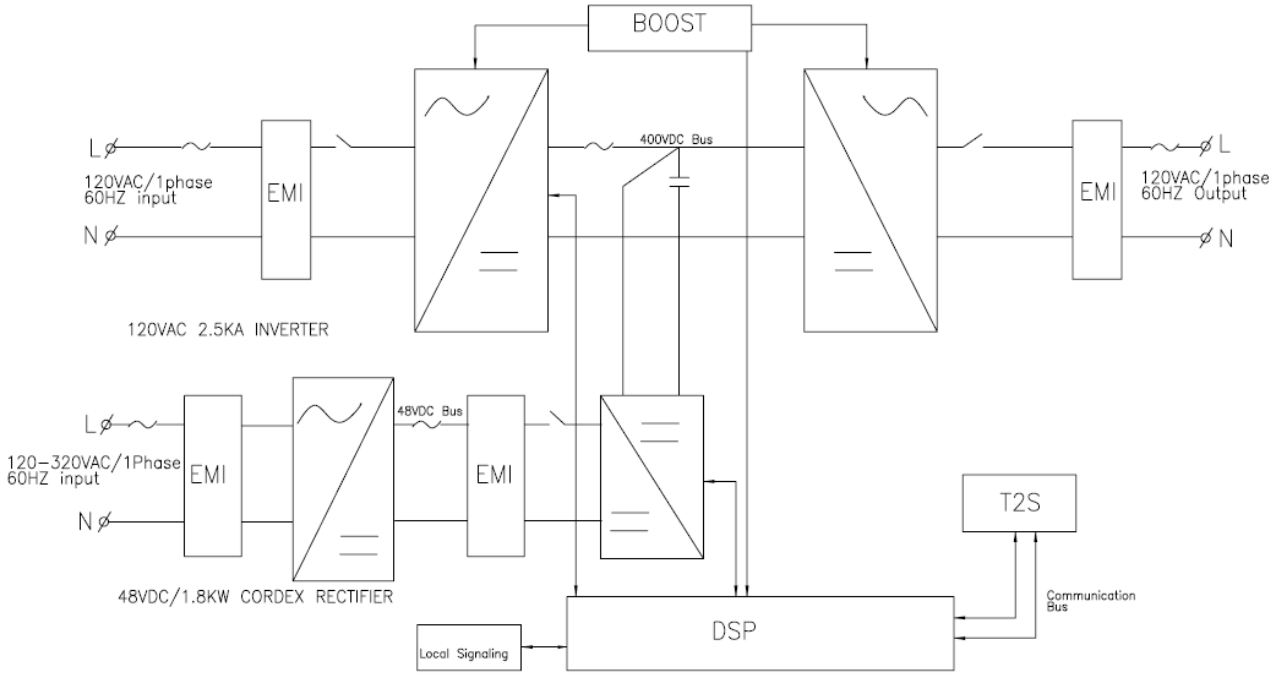
2.4 System Operation

The AFP 10 UPS operates as an on-line, double-conversion, fully automatic system in the following modes (please note the AFP 10 UPS system's block diagram below):



A. NORMAL - Incoming AC power is boosted using a switching circuit, and converted into DC power to power the inverter module. The inverter then converts DC power to regulated AC power which feeds the load. Additionally, the AC input source provides power to the Cordex rectifier to either charge a battery bank or to operate at float charging mode to maintain a battery bank.

B. EMERGENCY - Upon failure of commercial AC power, the UPS derives power from the battery bank and continues to feed the load with clean, regulated AC power. There is no interruption to the critical load upon failure or restoration of commercial AC power.

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C. RECHARGE - Upon restoration of the commercial AC source, the switched mode rectifier/charger powers the inverter while simultaneously recharging the battery bank. The AFP 10 UPS has the following recharge process:

a) a constant level of current is used to recharge the batteries (the process utilizes a current-limit function to prevent overcharging batteries, thus extending the life of the batteries).
b) as the batteries reach the normal charge level, a constant-voltage control begins which causes the battery recharge current to gradually decrease.
c) under normal operation, the UPS battery bank "floats" at the 2.25-2.27 volts per cell DC level to stay fully charged and ready for the next discharge.

D. BYPASS MODE - Upon detection of an internal inverter fault, the UPS automatically switches from inverter power to an AC input source via the built-in static switch. Transfer occurs within 1 millisecond, causing no interruption to the critical load. Return from the bypass mode is an automatic function, without interruption to the critical load. Transfer to Bypass may also be performed as a manual operation via the UPS manual bypass switch located in the front panel.

E. POWER CONDITIONING MODE - Should the batteries be removed from the UPS, the UPS continues to function and provides protection against spikes, common/normal mode noise, load steps and frequency shifts (without battery back-up capability).

3.0 SYSTEM SPECIFICATIONS

A. UPS Input

1) Input Voltage: 120VAC (Supervised)
2) Input Voltage Requirement: 1 Phase, 2 Wire + Ground
3) Input Current: 12AMax @ 90-135VAC per each rectifier module. 20.8A @ 120VAC Nominal per each inverter module.
4) Rated Frequency: 50/60 Hz
5) Nominal Battery Voltage: 48VDC
6) Maximum Charge Current: 220A
7) Maximum Battery Capacity: 1600Ah (Supervised)

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B. UPS Output

1) Rated Voltage: 120VAC
2) Output Voltage Requirements: 1 Phase, 2 Wire + Ground
3) Output Capacity: 5/7.5/10 kVA
4) Rated Load Power Factor: 0.75 lagging
5) Frequency: 50-60Hz.
6) Programmable Relays: 60VDC, 1A, Resistive (Supplemental use)

C. Environmental

1) Operating Temperature: UPS: 32° to 120°F (0° to 49°C)
   Battery: 68° to 77°F (20° to 25°C)
2) Storage Temperature: UPS: -4° to 140°F (- 20° to 60°C)
   Battery: prolonged storage above 104°F (40°C) causes rapid battery degradation
3) Relative Humidity: 90% (non-condensing)

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

1. Please read this manual prior to use to become familiar with the product's numerous features and operating procedures. To obtain a maximum degree of safety, follow the sequences as outlined.

2. This manual provides warnings and special notes for the user:

    a. Points that are vital to the proper operation of the product or the safety of the operator are indicated by the heading: **WARNING** or **SECURITY & SAFETY.**

    The symbols listed above also alert the user to warnings.

    b. A notation that is in **Bold *or Italic*** typeface covers points that are important to the performance or ease of use of the product.

3. Before using the product, read all instructions and cautionary markings on the product and any equipment connected to the product.

4. Only qualified personnel should install, operate, and service the product and its components.

5. Observe all applicable national and local electrical codes when installing the product.

6. Always assume electrical connections or conductors are live.

7. Do not expose the product to rain or snow; install only in a clean, dry environment.

8. **CAUTION** – Unless otherwise noted, use of an attachment not recommended or sold by the product manufacturer may result in a risk of fire, electric shock, or injury to persons.

9. **CAUTION** – Do not operate the product if it has received a sharp blow, it has been dropped, or otherwise damaged in any way – return it to a qualified service center for repair.

10. **CAUTION** – Do not disassemble the product – call our qualified service centers for servicing. Incorrect reassembling may result in a risk of electrical shock or fire.

11. **CAUTION** – The TSI inverter rack is not supplied with internal disconnect devices and is a dual input power supply system. For proper installation, system access, and safety instructions (including proper grounding), please refer to Chapter 3 of the TSI Inverter Installation manual.

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INSTALLATION

1.1 RECEIVING THE AFP 10 UPS

When the UPS is received, please attend immediately to its unpacking, carefully removing all shipping material and packaging. Carry out an accurate visual inspection to ensure that the equipment has not been damaged during transport. Make sure to save all packaging and shipping materials until it has been determined that no shipping damage has occurred.

IMPORTANT

If any damage is discovered upon delivery of the UPS, make sure to notate damages on all copies of the delivering carrier's delivery receipt prior to signature. If damage is discovered after the delivery, immediately notify the delivering carrier and request an inspection. The manufacturer assumes no liability for damages during transportation and handling.

1.2 STORING THE AFP 10 UPS

Should the UPS need to be stored prior to installation, it should be stored in its original shipping packaging, in an upright position as indicated on the packaging. The UPS should only be stored in a temperature-controlled, dry, and dust-free sheltered room.

1.3 HANDLING AND LOCATING OF THE AFP 10 UPS

For handling of the UPS prior to installation, it is recommended that the UPS remain attached to its shipping pallet, to reduce risk of over-turning. Immediately prior to the UPS installation, the UPS should be removed from the shipping pallet. The UPS should then be placed into the final installation position by use of a forklift.

The UPS must be installed in a clean, dust-free, dry room. If the UPS includes an internal VRLA battery bank, the room must be properly ventilated in order to reduce heat and provide for optimum system performance. It is strongly recommended that the UPS be installed in a temperature-controlled room in order to maximize the life of the battery bank.

1.4 AC INPUT/OUTPUT CONNECTION

The electrical connections are a part of the installation that must be provided by a qualified, trained UPS installer, and must meet all standards per local electrical code. The manufacturer of the AFP 10 UPS is not responsible for the electrical connection. The following information is provided to serve only as a guideline for the qualified installer. However, the AFP 10 UPS manufacturer recommends that the installer use correct cable sizes and circuit breakers as shown below:

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There are 4 x 32A Circuit Breakers (CB1 to CB4) used for AC inputs to all rectifiers, installed on two rectifier shelves.

CB5 is the main AC input and CB7 is the AC output of the unit.

NUMBER OF RECTIFIERS ON AC FEED	AC INPUT CBs	AC INPUT CB SIZE	AC OUTPUT CBs	AC OUTPUT CB SIZE	WIRE SIZE
2	CB1	32A	N/A	N/A	#10
2	CB2	32A	N/A	N/A	#10
2	CB3	32A	N/A	N/A	#10
2	CB4	32A	N/A	N/A	#10
N/A	CB5	100A	N/A	N/A	#2
N/A	N/A	N/A	CB7	100A	#2

The Input and Output terminals are located at the right side of the AFP 10 UPS and can easily be accessed from the front of the UPS (see figure 1 below). All GND wires must be properly connected to GND TBs with the same gauge sizes of AC L & N wires.

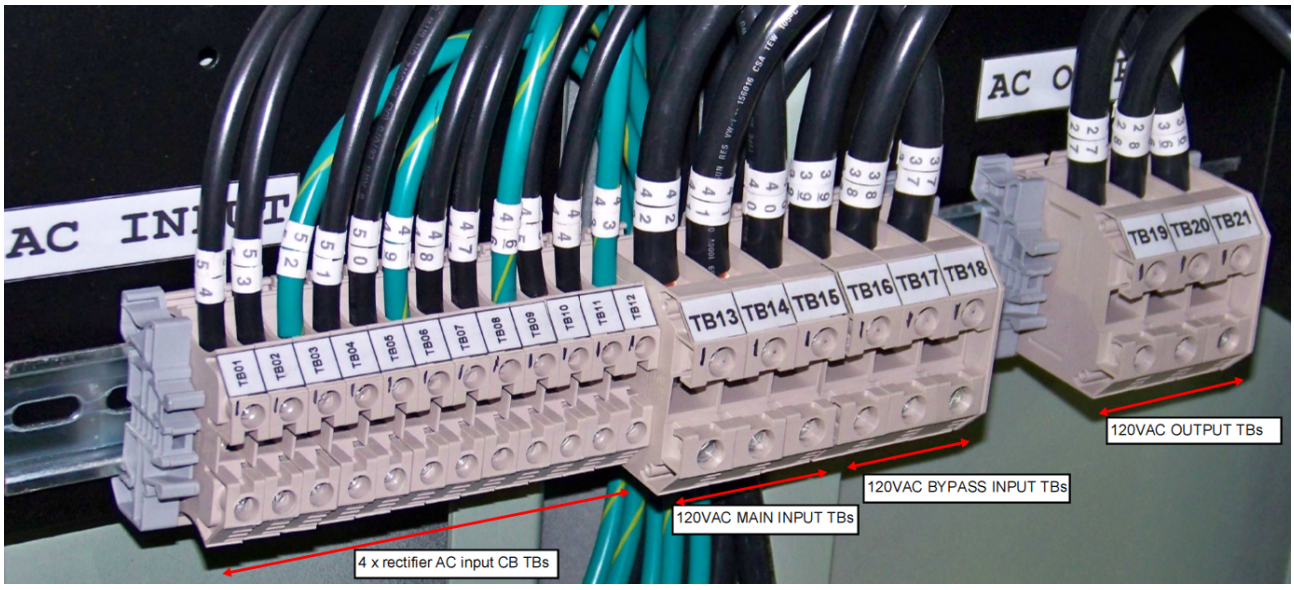

Figure 1

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Please refer to the AFP 10 UPS electrical drawing (see Section 5, UPS System Drawings) for inputs and output connection.

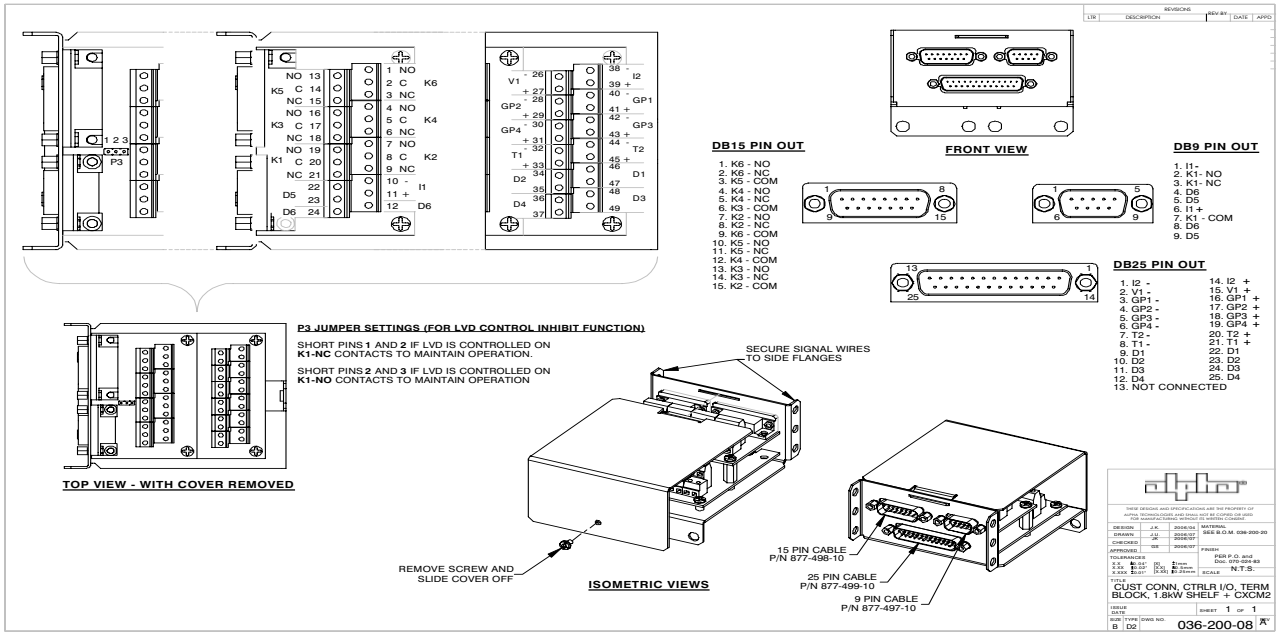
For alarm relay contacts for remote monitoring, access the alarm contact terminals by removing the communication terminal cover (see figure 2 below). See page 8 for ratings.

Figure 2

NOTE: All intermediate communication devices (router, SCADA, etc.) required for remote monitoring communications must be located within the same room in which the AFP 10 UPS unit is installed. All intermediate supplemental communication devices must be UL listed.

All alarm free voltage relay contacts are programmable via the Cordex controller software.

Please refer to the Cordex controller software section (see Section 3B) and alarm contact identifications as illustrated in the drawing below:



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1.5 CHARGING CURRENT & BATTERY VOLTAGE MEASUREMENT TERMINALS

There are charging current and battery voltage measurement terminals located between CB5 & CB7 of the unit (see figure 3 below).

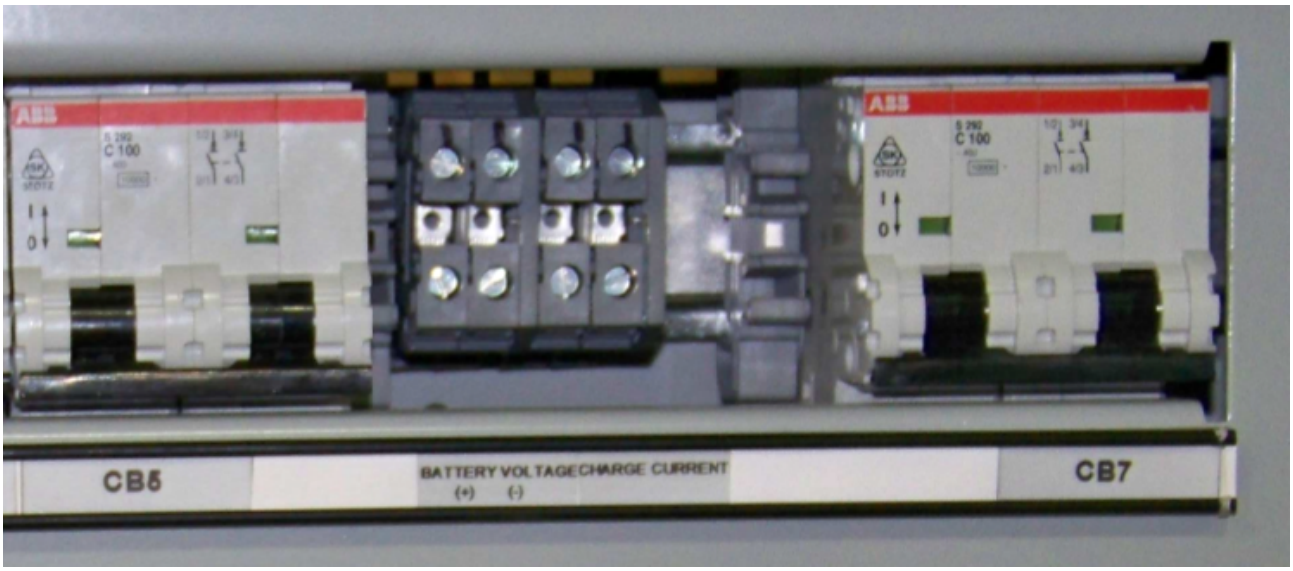

Figure 3

1.6 BATTERY CONNECTION

The UPS back-up battery bank may be a 48VDC external battery set (VRLA or flooded battery type) with a battery back-up time of greater than 15 minutes, or an internal 100AH/48VDC max. battery bank (VRLA battery type only) installed on a battery tray located on the bottom floor of the UPS (see figure 4 below). For any battery banks used with the UPS, please follow the battery manual provided by the battery manufacturer to insure proper installation and maintenance of the battery bank.

Figure 4

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Note: The stand-by battery maximum operating back-up time (1600AH VRLA battery) is 10.5 hours, with a battery re-charge time within 48 hours. This figure is based on the AFP10 UPS with a full load of 7 Cordex rectifier modules.

Please refer to the battery manufacturer's manual for detailed battery specifications.

Please refer to the AFP10 UPS electrical drawing (see Section 5) for battery connection to the UPS.

Note: Only a qualified battery installer should be used for installation of the battery bank, and should use only correctly sized battery connecting cables, as defined by the load current requested for the AFP 10 UPS unit.

To obtain the battery life indicated by the battery manufacturer, the operating temperature must remain between 0 and 25 °C. However, although the battery can operate in temperatures up to 40 °C, a significant reduction of the battery life will occur. Further, to avoid the formation of potentially explosive gasses, suitable ventilation must be provided at the location of the battery, per NFPA 70 PE requirements.

Warning: CORRECT BATTERY POLARITY CONNECTIONS MUST BE FOLLOWED TO AVOID SERIOUS DAMAGE TO THE AFP 10 UPS UNIT.

Note: Limited to same room battery bank installations. Non-power limited wiring required. Battery connection must be in an area of limited access. Must be approved by AHJ.

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Component Manual Reference Information

For detailed information (specifications, features, configuration, etc.) concerning the Cordex™ 48VDC Modular Switched Mode Rectifier System, please refer to Manual 030-809-B2 Rev. B, “CXRF 48-1.8kW”, 2008.

For detailed information concerning the Cordex ™ Controller Software, Version 2.0, please refer to Manual 034-136-B2 Rev. B, “Cordex Controller Software Version 2.0”, 2009.

For detailed information (specifications, features, configuration, etc.) concerning the Bravo TSI 120VAC Inverter System, please refer to Manual “TSI BRAVO 120VAC User Manual V3.3”, 3/2/2009.

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Technical Drawings

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REVISIONS			
LTR	DESCRIPTION	DATE	APPD

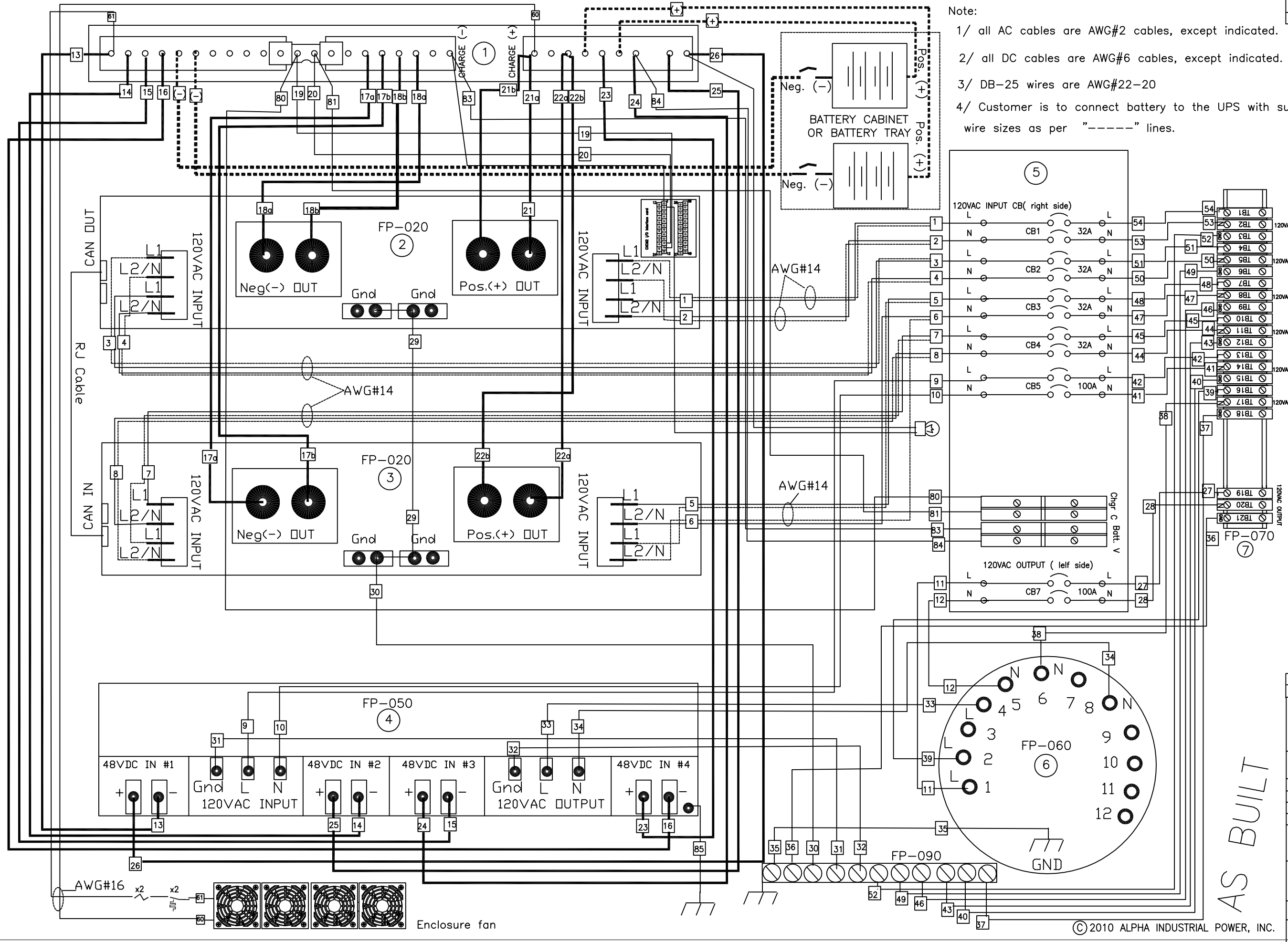
Note:

1/ all AC cables are AWG#2 cables, except indicated.

2/ all DC cables are AWG#6 cables, except indicated.

3/ DB-25 wires are AWG#22-20

4/ Customer is to connect battery to the UPS with suitable wire sizes as per "-----" lines.



LEGEND:

1/ (1) Terminal bar

2/ (2) Rec. Shelf#1

3/ (3) Re. Shelf#2

4/ (4) Inverter

5/ (5) I/O Panel

6/ (6) Manual Bypass Sw.

7/ (7) IN/OUT Terminal

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

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DESIGN	Lan D.	12-01-10	CUSTOMER PROJECT:
DRAWN	QL	12-01-10	
CHECKED	D. Q	12-01-10	
APPROVED	Customer		CUSTOMER PO#:
TOLERANCES (UNLESS OTHERWISE NOTED)			SCALE N/A

TITLE

AFP10-050-2I1

ISSUE DATE	12-01-10	SHEET	1 OF 1
SIZE	TYPE	DWG NO.	REV
B	A2	AFP10-050-2I1-DWG	05

AS BUILT

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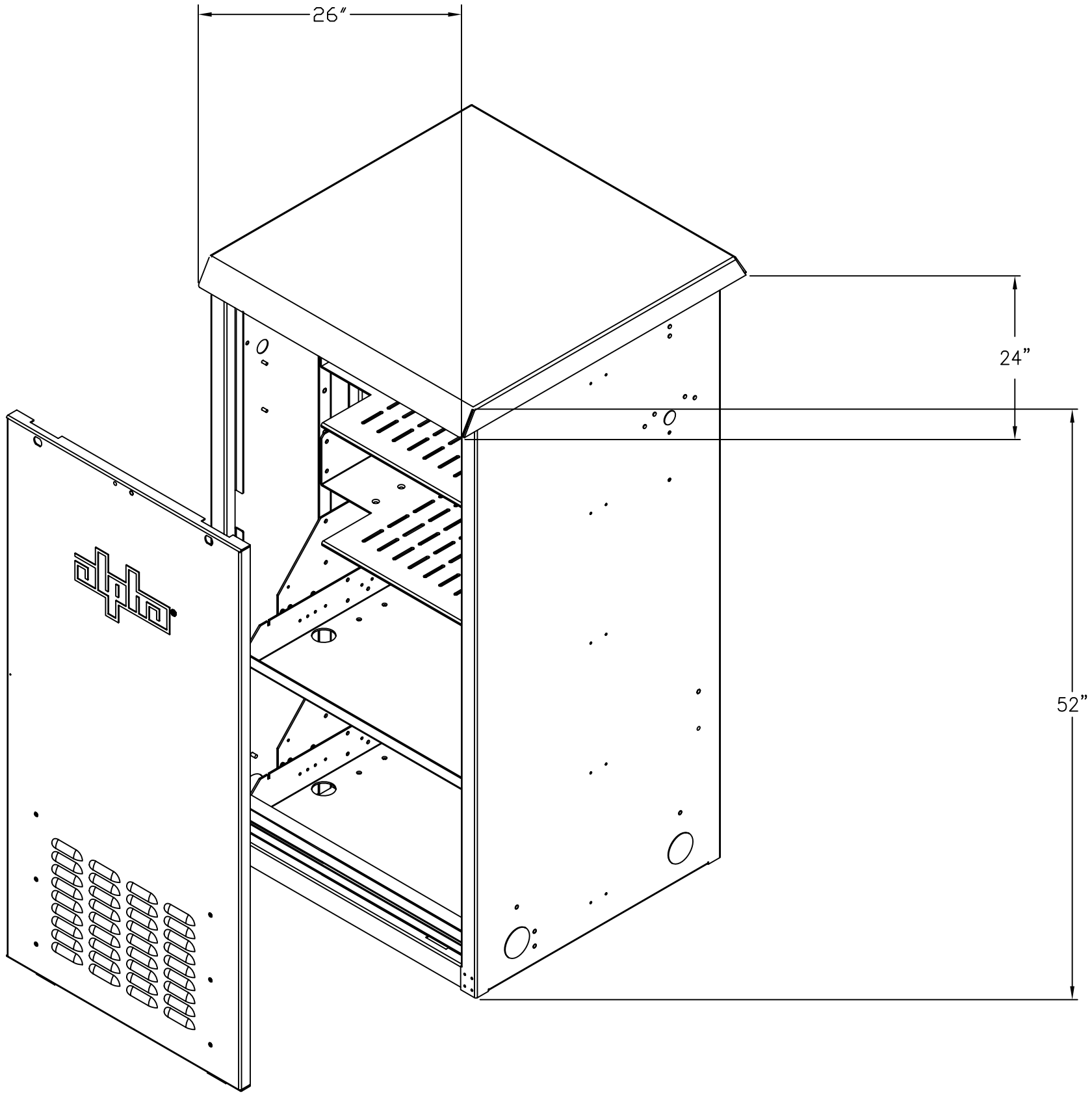
REVISIONS			
LTR	DESCRIPTION	DATE	APPD



LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

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DESIGN	Lan D.	05-11-09	CUSTOMER PROJECT:
DRAWN	QL	05-11-09	
CHECKED	D. Q	05-12-09	
APPROVED	Customer		CUSTOMER PO#:
TOLERANCES (UNLESS OTHERWISE NOTED)			SCALE N/A

TITLE

PF-48-5000-120-PN4 CABINET

ISSUE DATE	05-13-09	SHEET	1 OF 1
SIZE	TYPE	DWG NO.	REV
B	A2	PF-48-5000-120-PN4-CAB	00

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ELECTRONIC/ELECTRICAL PRODUCT WARRANTY

Alpha Industrial Power (A.I.P) warrants to the original user that its rectifying equipment, load banks, DC-DC converters, chargers and UPS systems are free from defects in factory workmanship and materials, such warranty being conditional upon the product having been installed, commissioned, operated and maintained by qualified personnel and according to manufacturer instructions. A.I.P liability is limited to repairing or replacing without charge at its factory any product or component, which is proven to the satisfaction of A.I.P to have been defective at the time it was sold, which at user's expense has been returned to A.I.P or authorized service center within 1 year from date of commissioning or 18 months from date of shipment, whichever occurs first. A.I.P repair or replacement of any defective product shall constitute fulfillment of his obligations. This Warranty applies to the manufactured products which are shown by the purchaser to have been originally defective and shall not apply to products which must be repaired or replaced due to normal wear, misuse, negligence, wreckage, accident, any ACT OF GOD or to products which have been repaired or altered outside of seller's factory or one of its authorized service centers unless authorized solely by A.I.P. Alpha Industrial Power shall not be liable for loss, damage, or expense, consequential or otherwise from the use of its products or from any other cause.

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or to their local authorized representative.

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FACTORY SERVICE INFORMATION

Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Alpha products. In the USA, call Alpha toll free 8:00 am to 5:00 pm Eastern Standard Time at:

1-800-996-6104

For emergencies, call 1-800-996-6104 24 hours a day, seven days a week.

Training

Alpha Industrial Power offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at www.alpha.com.

Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Alpha Industrial Power at the locations listed to the right.

Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Alpha factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. An RMA number may also be requested at www.alpha.com/RMA. All material must be pre-authorized before being returned. Product received without an RMA number will be refused, repairs will not be processed, and credit will not be issued.

Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit.

Factory Service Centers

USA

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